

QUEENSLAND PERMIAN SPECIES OF THE SPIRIFERID BRACHIOPODS
PUNCTOSPIRIFER AND *CLEIOTHYRIDINA*

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ABSTRACT

Two species of *Punctospirifer* occur in the Permian deposits of Queensland; they are *P. australis* (Maxwell) which is transferred from *Spiriferellina* because of its lirate rather than granulose micro-ornament, and *P. etheridgei* sp. nov. Queensland Permian specimens of *Cleiothyridina* are referable to two species herein termed *Cleiothyridina* sp.A and *Cleiothyridina* sp.B. *Cleiothyridina* sp.B includes the Peawaddy Formation specimens referred by Campbell (1953) to both *Cleiothyridina* and *Spirigerella*.

The spiriferids *Punctospirifer* North, 1920, and *Cleiothyridina* Buckman, 1906, are relatively uncommon in the Queensland Permian and because neither genus seems to occur in deposits of Permian age elsewhere in eastern Australia their distributions may be of palaeogeographical importance. Of the eleven spiriferid genera (*Trigonotreta* Koenig, 1825; *Notospirifer* Harrington, 1955; *Subansiria* Sahni and Srivastava, 1956; *Ingelarella* Campbell, 1959a; *Fusispirifer* Waterhouse, 1966; *Sulciplica* Waterhouse, 1968; *Pseudosyrinx* Weller, 1914; *Attenuatella* Stehli, 1954; *Punctospirifer*; *Martinia* McCoy, 1844; *Cleiothyridina*) that occur in the Queensland Permian, three (*Punctospirifer*, *Martinia*, and *Cleiothyridina*) are as yet unknown from the Permian of New South Wales (excluding the Drake area in northern N.S.W.) and five (*Pseudosyrinx*, *Attenuatella*, *Punctospirifer*, *Martinia*, and *Cleiothyridina*) are unrecorded from the Tasmanian Permian. There is an increase in the generic diversity of eastern Australian Permian spiriferids from Tasmania to Queensland, although the absences of genera from some areas may be due to collection failure. Future work will undoubtedly enable more detailed generic distributions to be presented. Meantime it is the purpose of the present paper to describe the Queensland Permian species of *Punctospirifer* and *Cleiothyridina*, and to discuss their distributions and ranges.

Figured and mentioned specimens housed in the collections of the Department of Geology of the University of Queensland and the Queensland Museum are denoted by a

number prefixed by the letters UQF and QMF respectively. Localities indexed at the former institution are referred to by a number following the letters UQL.

Subfamily SPIRIFERININAE Davidson, 1884

REMARKS: On page 354 of his General Summary to the British Fossil Brachiopoda, Davidson (1884) used the name 'Sub-Family Spiriferinidae' to embrace the genera *Spirifer*, *Cyrtia*, *Syringothyris*, *Cyrtina*, *Reticularia*, *Martinia*, *Martiniopsis*, *Spiriferina*, *Mentzelia*, *Ambocoelia*, and *Suessia*. Elsewhere in the same volume and in his earlier volumes on the British Fossil Brachiopoda Davidson had used the name Spiriferidae (Davidson, 1858, vol. 2, pt. 4, p. 12; vol. 2, pt. 5, p. 19; 1864, vol. 3, pt. 6, p. 13; 1866, vol. 3, pt. 7, p. 83; 1884, vol. 5, pt. 3, pp. 350, 368, 369, and footnote 2 on p. 373) for this group of genera. For this reason it seems almost certain that Davidson's (1884, p. 354) usage of Spiriferinidae was an inadvertent error. Possibly the first authors to define the category Spiriferinidae (which is based on the generic name *Spiriferina*) as distinct from the Spiriferidae were Hall and Clarke in 1894.

Genus *Punctospirifer* North, 1920

TYPE SPECIES (by original designation): *Punctospirifer scabricosta* North, 1920 from the Ashfell Sandstone in the Ravenstonedale district, England.

DIAGNOSIS: Shell biconvex, with distinct sulcus and fold; both valves possess cardinal areas and simple plications on their flanks; the ventral area is striated parallel to and perpendicular to the cardinal margin; ventral valve sub-pyramidal; the surfaces of the valves bear imbricating growth lamellae and a micro-ornament of radial and concentric lirae; in the ventral valve dental lamellae and a median septum are well developed.

REMARKS: The diagnosis is based on Campbell's (1959b) redescription of *Punctospirifer scabricosta*. *Punctospirifer scabricosta* possesses a lirate micro-ornament (Campbell, 1959b, pl. 60, fig. 1) that is quite distinct from the granulose micro-ornament (Campbell, 1959b, pl. 60, fig. 3) of the type species of *Spiriferellina*.

RANGE IN QUEENSLAND PERMIAN: Early Lower Permian (Sakmarian) to late Lower Permian or early Upper Permian.

Punctospirifer australis (Maxwell, 1964)

(Pl. 25, figs. 3-5, 11, 20)

Spiriferellina sp. Campbell, 1953, pl. 2, figs. 9-11.

HOLOTYPE: UQF42868 from the Burnett Formation of UQL1932.

DIAGNOSIS: Shell rounded in outline and widest at or just in front of the cardinal margin; ventral valve sub-pyramidal; sulcus widens rapidly anteriorly and is bordered by prominent plications; there are two or three additional plicae on each flank; fold rounded and on each side of it there are usually three plications; generally the innermost of these are much more prominent than the others; the external surfaces of the valves are covered with concentric lamellae, and radial and concentric lirae; the lirae form a reticulate pattern; the radial lirae number 10 to 15 per millimetre; ventral septum thin, extending for less than a half of the length of the valve; dental plates less than half as long as the septum; in the posterior half of the dorsal valve there is a low median ridge; the shell is punctate, there being between 20 and 30 punctae per square millimetre in the anterior half of the sulcus.

DESCRIPTION: see Maxwell (1964).

REMARKS: *Punctospirifer australis* is transferred from *Spiriferellina* to *Punctospirifer* because of its lirae (pl. 25, fig. 20) rather than granulose micro-ornament.

DISTRIBUTION: *Punctospirifer australis* occurs in the Burnett Formation, the Cattle Creek Formation (UQL238), the Barfield Formation (UQL850), and the Peawaddy Formation (Campbell, 1953, p. 3; UQL239). No micro-ornament is preserved on the specimens from the last three formations but otherwise the specimens are very similar to Maxwell's specimens of *P. australis*. A specimen not figured herein (UQF54615) from the Tiverton Formation at UQL3127 may also be a representative of *P. australis*.

AGE: Upper Sakmarian to either late Lower Permian or early Upper Permian. Runnegar (1967) considers that the fauna of the Burnett Formation is probably a correlative of the fauna in the Allandale Formation in the Sydney Basin for which Dickins (1969) suggests an upper Sakmarian age. The fauna in the Peawaddy Formation (Fauna IV of Dickins in Malone *et al.*, 1964) is equated with faunas of supposed Kungarian age by Waterhouse (1963) and Runnegar (1967), and with faunas of Kazanian age by Dickins (1964).

***Punctospirifer etheridgi* sp. nov.**

(Pl. 25, figs. 6–10, 12–19, 21, 22)

Spiriferina duodecemcostata (McCoy); Etheridge *Jr.*, 1892, pl. 44, fig. 12.

HOLOTYPE: UQF54612 from the Tiverton Formation at UQL3127.

PARATYPES: QMF6329–6332 and UQF54610, UQF54611 and UQF54614 from the Tiverton Formation at the same locality as the holotype.

DIAGNOSIS: Shell more transverse than *P. australis* with four to six plications on each of the flanks of the valves; ventral septum strong and about one half as long as the valve;

dental plates wedge-shaped, extending approximately to the mid-length of the septum; there is a low median ridge in the posterior part of the dorsal valve; micro-ornament on the shell comprises concentric lamellae and radial and concentric lirae.

DESCRIPTION: The shell is small and transverse with a uniplicate commissure. It is widest at or in front of the cardinal margin. The ventral valve is sub-pyramidal with a high apsacline area and moderately convex flanks. There are four, five, or six sub-angular plications on each flank and those limiting the sulcus are not as divergent as in *P. australis*. On the dorsal valve there are usually five plications on each side of the fold. Ornamentation on the valves consists of concentric growth lamellae and radially and concentrically arranged lirae. The lirae form a reticulate pattern and the radial elements have a concentration of 20–25 per millimetre (pl. 25, figs. 21, 22).

In the ventral valve the septum is about one half as long as the valve, and it is generally thicker than the septum of *P. australis*. Commonly the anterior edge of the septum is swollen (pl. 25, fig. 17). No punctae occur in the septum. The adminicula lie in the furrows bordering the sulcus and may extend to the mid-length of the septum. Umbonal cavities are sometimes slightly thickened and some callus may be deposited in the delthyrial cavity. The field of muscular attachment in the ventral valve is an elliptical area between the adminicula and it extends to the anterior edge of the septum. The areas of diductor muscle attachment lie on the floor of the valve whereas the adductors were connected partly to the floor of the valve and partly to the septum.

In the posterior part of the dorsal valve there is a low ridge separating the scars of adductor muscle attachment. The latter comprise a pair of large anterior adductors and a pair of smaller posterior adductors. The cardinal process consists of a series of delicate

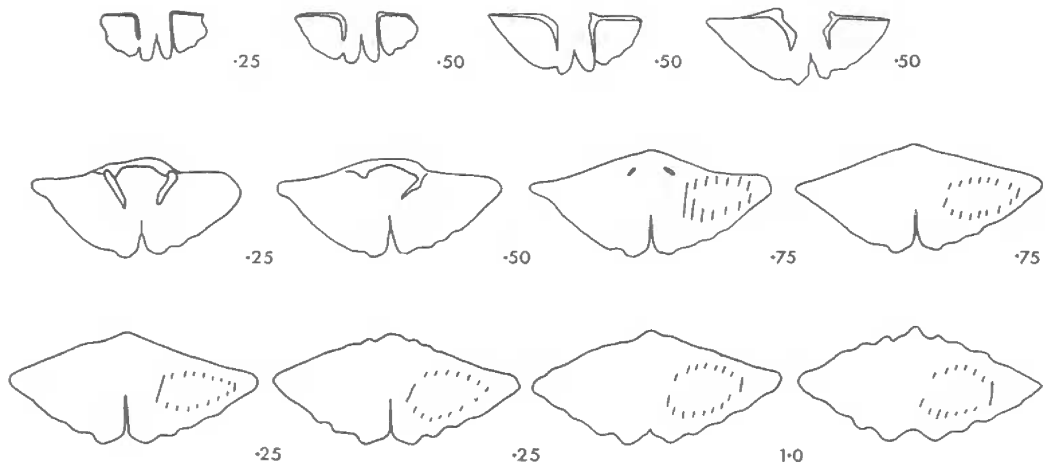


FIG. 1: Serial sections of a toptypical specimen of *Punctospirifer etheridgei* sp. nov. The intervals between successive sections are shown on the diagram in millimetres.

lamellae aligned parallel to the median plane of the shell. The crural bases arise from the inner sides of the inner socket ridges and extend anteriorly to form laterally directed spiral brachidia. Serial sections of a specimen of *P. etheridgei* are illustrated in figure 1. The shell of *P. etheridgei* is punctate and in the anterior part of the sulcus of the holotype the punctae number between 20 and 30 per square millimetre. Punctae are present throughout the shell comprising the areas of the valves.

COMPARISON: Shells of *Punctospirifer etheridgei* are distinguished from those of *P. australis* by their more transverse outlines, their more plicate flanks, their generally narrower sulci, the normally longer and thicker septa in their ventral valves, and the less prominent and divergent plications along the margins of their sulci.

DISTRIBUTION: In addition to its occurrence at the type locality this species is known from the Wallaby Beds in the Stanthorpe Road Fault Block south of Warwick (UQL3030), and in the Buffel Formation. Small specimens of *Punctospirifer* (pl. 25, fig. 19) from the Wallaby Beds are almost indistinguishable from specimens of *P. australis* from the Burnett Formation.

AGE: Lower Permian, probably lower Artinskian (Aktastinian). Work by Dear (1966) and Armstrong *et al.* (1967) suggests that the fauna of the Tiverton Formation (i.e. Fauna II of Dickins in Malone *et al.*, 1964) is of lower Artinskian age. The faunas in the Wallaby Beds and the Buffel Formation are correlative with Fauna II and are also considered to be of Lower Artinskian age (see Runnegar, 1967).

Subfamily ATHYRIDINAE McCoy, 1844

Genus *Cleiothyridina* Buckman, 1906

TYPE SPECIES (by original designation): *Cleiothyridina deroissyi* Leveille, 1835.

RANGE IN QUEENSLAND PERMIAN: Lower Artinskian to late Lower Permian or early Upper Permian.

Cleiothyridina sp.A

(Pl. 25, fig. 2)

DESCRIPTION: There is only one specimen of this species from the Tiverton Formation at UQL3127. The specimen is an external mould of a dorsal valve and part of a ventral valve. The dorsal valve has a strong median convexity but lacks a real fold. It is widest posterior to its mid-length and is approximately as wide as it is long. Imbricating growth lamellae cover the entire valve and each lamella gives rise to flat spines, which number about three per millimetre along a lamella. The commissure of the specimen is gently uniplicate although on the visible part of the ventral valve there is no sulcus.

AGE: Armstrong *et al.* (1967) consider that the fauna in the Tiverton Formation (i.e. Fauna II of Dickins in Malone *et al.*, 1964) is probably of Lower Artinskian (Aktastinian) age.

Cleiothyridina sp.B

(Pl. 25, fig. 1)

Cleiothyridina sp. nov. Campbell, 1953, p. 16, pl. 3, figs. 11–16.

Spirigerella sp. nov. Campbell, 1953, p. 15, pl. 6, figs. 1–6.

Cleiothyridina sp. Hill and Woods, 1964, pl. P7, figs. 11, 12.

DESCRIPTION: Campbell (1953, p. 16) described specimens of *Cleiothyridina* from the Peawaddy Formation. Dorsal valves of the specimens are less convex medially than the dorsal valve of *Cleiothyridina* sp.A, and commonly they bear a median flattening or furrow (Hill and Woods, 1964, pl. P7, fig. 11). The ventral valve also bears a faint sulcus (Hill and Woods, 1964, pl. P7, fig. 12). The external surface of the shell is covered with imbricating growth lamellae which give rise to flat spines that extend forward, approximately in the same plane as their parent lamella. The spines number about three per millimetre along a lamella.

An external mould of a fragment of a valve from the *Strophalosia clarkei* bed has a distinct median depression and could be a representative of *Cleiothyridina* sp.B (pl. 25, fig. 1). However the fragment is too small to enable positive identification.

Campbell (1953, p.15) included seven specimens from the Peawaddy Formation in *Spirigerella* sp. nov. These were collected from the same locality which yielded the specimens that Campbell identified as *Cleiothyridina* sp. nov. All of Campbell's specimens of *Spirigerella* sp. nov. are decorticated shells lacking obvious external ornament whereas his *Cleiothyridina* specimens have the lamellose-spinose ornament that is characteristic of *Cleiothyridina*. From Campbell's descriptions and figures it is clear, apart from details about their ornament, that his specimens of *Cleiothyridina* and *Spirigerella* are very similar. Internally the Peawaddy specimens of these genera are almost identical and the external differences described by Campbell seem to be the result of differing states of preservation. On a number of the specimens (i.e. UQF14220, 14221, 14223) which Campbell included in *Spirigerella* sp. nov. there is an ornament of growth lamellae and on one of these specimens (UQF14223) the lamellae extend for one millimetre from the surface of the shell. The lamellae are visible in patches of matrix adhering to the exteriors of the shells. The lamellae are quite numerous and their concentrations vary from three per millimetre at about the midlength of one shell (UQF14223) to eight per millimetre at the lateral margin of the same shell. Some of the lamellae on the above shell give rise to fine spinose projections. In view of the existence of lamellae on a number of the apparently smooth specimens of *Spirigerella* described by Campbell there is little doubt that Campbell's *Cleiothyridina* and *Spirigerella* specimens from the Peawaddy Formation are conspecific.

AGE: Late Lower Permian or early Upper Permian.

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